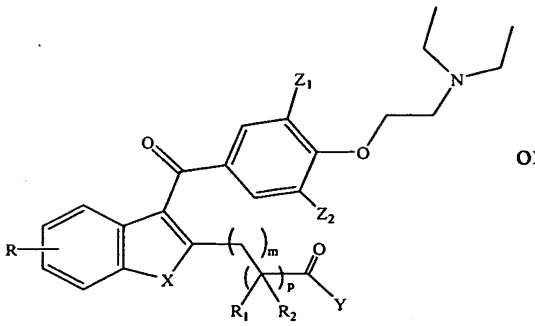
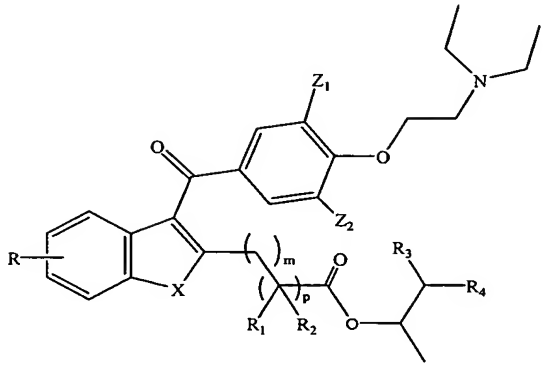
Claims

I claim:

1. A compound, or a salt thereof, wherein said compound has the following structures:



or



Formula I Formula II

wherein Z_1 and Z_2 may be the same, or different, and are a halogen selected from the group consisting of iodine, fluorine, bromine, and chlorine; X can be O, S, or NH;

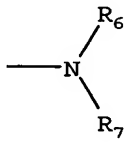
m is from 0 to 4;

p is 0 or 1;

R=H, OH, NH_2, SH, halide, alkyl, O-alkyl, acyl, O-acyl, aryl, O-aryl, substituted amine, or substituted thiol;

R_1 and R_2 can be the same or different and are, independently H, methyl, ethyl, propyl, with the proviso that R_1 and R_2 are not both H; alternatively, R_1 and R_2, together, can form a cyclopropyl, cyclobutyl, cyclopentyl, or a cyclohexyl group;

Y = OR_5, wherein R_5 is a straight or branched chain alkyl or heteroalkyl having 1 to 8 carbon atoms, a substituted or unsubstituted aryl or heteroaryl; or



wherein R_6 and R_7 are independently selected from H, alkyl or heteroalkyl of 1 to 6 carbon atoms, or wherein N is part of a cyclic or heterocyclic group comprising morpholine, triazole, imidazole, pyrrolidine, piperidine, piperazine, pyrrole, dihydropyridine, aziridine, thiazolidine, thiazoline, thiadiazolidine, or thiadiazoline; and

R_3 and R_4 can be the same or different and can be a moiety selected from the group consisting of $C_{n\text{-}20}$alkyl, $C_{n\text{-}20}$ heteroalkyl, $C_{2\text{-}20}$ alkenyl, aryl, $C_{1\text{-}20}$ alkyl-aryl, $C_{2\text{-}20}$ alkenyl-aryl, heteroaryl, $C_{1\text{-}20}$alkyl-heteroaryl, $C_{2\text{-}20}$ alkenyl-heteroaryl, cycloalkyl, heterocycloalkyl, $C_{1\text{-}20}$ alkyl- heterocycloalkyl, and $C_{1\text{-}20}$ alkyl-cycloalkyl, any of which may be, optionally, substituted with a moiety selected from the group consisting of $C_{1\text{-}6}$ alkyl, halogen, CN, NO_2, or $SO_{2\text{-}4}$, or wherein N is part of a cyclic or heterocyclic group, preferentially, but not limited to, morpholine, triazole, imidazole, pyrrolidine, piperidine, piperazine, pyrrole, dihydropyridine, aziridine, thiazolidine, thiazoline, thiadiazolidine, or thiadiazoline; wherein n is from 1-19.

2. The compound, according to claim 1, wherein R is H and X is O.

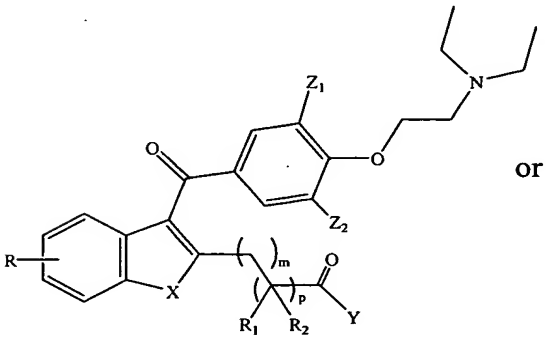
3. The compound, according to claim 1, wherein the salt of said compound is selected from the group consisting of hydrobromide, hydrochloride, malate, p-toluenesulfonate, phosphate, sulfate, perchlorate, acetate, trifluororacetate, proprionate, citrate, malonate, succinate, lactate, tartrate, benzoate, morpholine, piperidine, dimethylamine, and diethylamine salts.

4. The compound, according to claim 3, wherein the salt of said compound is a sulfate salt.

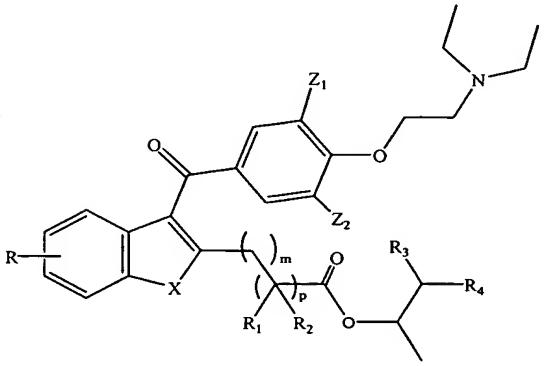
5. The compound, according to claim 1, wherein X_1 and X_2 are iodine, m = O, p = 1, at least one of R_1 and R_2 is methyl and the other is H or methyl, and R_5 is selected from the group consisting of methyl, ethyl, propyl, isopropyl, butyl, isobutyl, (R,S)-2-butyl, (S)-2-butyl, and (R)-2-butyl.

6. The compound, according to claim 1, in substantially single enantiomer form having at least 80% enantiomeric excess.

7. A pharmaceutical composition for treating cardiac arrhythmia in an animal wherein said pharmaceutical composition comprises a compound, or salt thereof, wherein said compound has one of the following structures:



or



Formula I Formula II

wherein Z_1 and Z_2 may be the same, or different, and are a halogen selected from the group consisting of iodine, fluorine, bromine, and chlorine; X can be O, S, or NH;

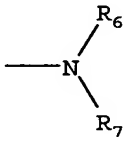
m is from 0 to 4;

p is 0 or 1;

R=H, OH, NH_2, SH, halide, alkyl, O-alkyl, acyl, O-acyl, aryl, O-aryl, substituted amine, or substituted thiol;

R_1 and R_2 can be the same or different and are, independently H, methyl, ethyl, propyl, with the proviso that R_1 and R_2 are not both H; alternatively, R_1 and R_2, together, can form a cyclopropyl, cyclobutyl, cyclopentyl, or a cyclohexyl group;

$Y = OR_5$, wherein R_5 is a straight or branched chain alkyl or heteroalkyl having 1 to 8 carbon atoms, a substituted or unsubstituted aryl or heteroaryl; or



wherein R_6 and R_7 are independently selected from H, alkyl or heteroalkyl of 1 to 6 carbon atoms, or wherein N is part of a cyclic or heterocyclic group comprising morpholine, triazole, imidazole, pyrrolidine, piperidine, piperazine, pyrrole, dihydropyridine, aziridine, thiazolidine, thiazoline, thiadiazolidine, or thiadiazoline; and

R_3 and R_4 can be the same or different and can be a moiety selected from the group consisting of $C_{n\text{-}20}$alkyl, $C_{n\text{-}20}$ heteroalkyl, $C_{2\text{-}20}$ alkenyl, aryl, $C_{1\text{-}20}$ alkyl-aryl, $C_{2\text{-}20}$ alkenyl-aryl, heteroaryl, $C_{1\text{-}20}$alkyl-heteroaryl, $C_{2\text{-}20}$ alkenyl-heteroaryl, cycloalkyl, heterocycloalkyl, $C_{1\text{-}20}$ alkyl- heterocycloalkyl, and $C_{1\text{-}20}$ alkyl-cycloalkyl, any of which may be, optionally, substituted with a moiety selected from the group consisting of $C_{1\text{-}6}$ alkyl, halogen, CN, NO_2, or $SO_{2\text{-}4}$, or wherein N is part of a cyclic or heterocyclic group, preferentially, but not limited to, morpholine, triazole, imidazole, pyrrolidine, piperidine, piperazine, pyrrole, dihydropyridine, aziridine, thiazolidine, thiazoline, thiadiazolidine, or thiadiazoline; wherein n is from 1-19.

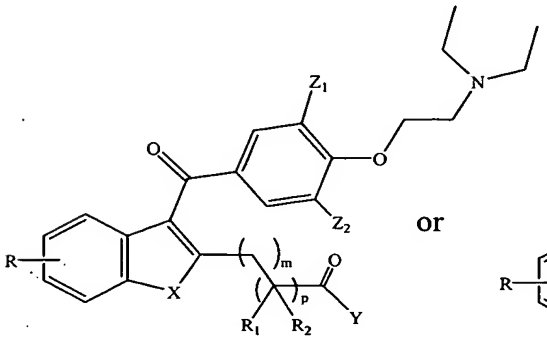
8. The pharmaceutical composition, according to claim 7, wherein R is H and X is O.

9. The pharmaceutical composition, according to claim 7, wherein the salt of said compound is selected from the group consisting of hydrobromide, p-toluenesulfonate, hydrochloride, malate, phosphate, sulfate, perchlorate, acetate, trifluororacetate, proprionate, citrate, malonate, succinate, lactate, tartrate, benzoate, morpholine, piperidine, dimethylamine, and diethylamine salts.

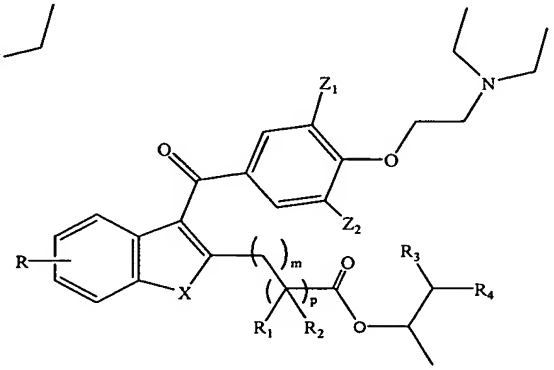
10. The pharmaceutical composition, according to claim 9, wherein the salt of said compound is a sulfate salt.

11. The pharmaceutical composition, according to claim 6, wherein wherein X_1 and X_2 are iodine, m = O, p = 1, at least one of R_1 and R_2 is methyl and the other is H or methyl, and R_5 is selected from the group consisting of methyl, ethyl, propyl, isopropyl, butyl, isobutyl, (R,S)-2-butyl, (S)-2-butyl, and (R)-2-butyl.

12. A method for treating cardiac arrhythmia in an animal, wherein said method comprises administering an effective amount of a compound, or salt thereof, wherein said compound has one of the following structures:



or



Formula I Formula II

wherein Z_1 and Z_2 may be the same, or different, and are a halogen selected from the group consisting of iodine, fluorine, bromine, and chlorine; X can be O, S, or NH;

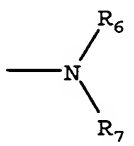
m is from 0 to 4;

p is 0 or 1;

R=H, OH, NH_2, SH, halide, alkyl, O-alkyl, acyl, O-acyl, aryl, O-aryl, substituted amine, or substituted thiol;

R_1 and R_2 can be the same or different and are, independently H, methyl, ethyl, propyl, with the proviso that R_1 and R_2 are not both H; alternatively, R_1 and R_2, together, can form a cyclopropyl, cyclobutyl, cyclopentyl, or a cyclohexyl group;

Y = OR_5, wherein R_5 is a straight or branched chain alkyl or heteroalkyl having 1 to 8 carbon atoms, a substituted or unsubstituted aryl or heteroaryl; or



wherein R_6 and R_7 are independently selected from H, alkyl or heteroalkyl of 1 to 6 carbon atoms, or wherein N is part of a cyclic or heterocyclic group comprising morpholine, triazole, imidazole, pyrrolidine, piperidine, piperazine, pyrrole,

dihydropyridine, aziridine, thiazolidine, thiazoline, thiadiazolidine, or thiadiazoline; and

R_3 and R_4 can be the same or different and can be a moiety selected from the group consisting of C_{n-20}alkyl, C_{n-20} heteroalkyl, C_{2-20} alkenyl, aryl, C_{1-20} alkyl-aryl, C_{2-20} alkenyl-aryl, heteroaryl, C_{1-20}alkyl-heteroaryl, C_{2-20} alkenyl-heteroaryl, cycloalkyl, heterocycloalkyl, C_{1-20} alkyl- heterocycloalkyl, and C_{1-20} alkyl-cycloalkyl, any of which may be, optionally, substituted with a moiety selected from the group consisting of C_{1-6} alkyl, halogen, CN, NO_2, or SO_{2-4}, or wherein N is part of a cyclic or heterocyclic group, preferentially, but not limited to, morpholine, triazole, imidazole, pyrrolidine, piperidine, piperazine, pyrrole, dihydropyridine, aziridine, thiazolidine, thiazoline, thiadiazolidine, or thiadiazoline; wherein n is from 1-19.

13. The method, according to claim 12, wherein R is H and X is O.

14. The method, according to claim 12, wherein said composition is administered to a mammal.

15. The method, according to claim 14, wherein said composition is administered to a human.

16. The method, according to claim 12, wherein said composition is administered in combination with a second pharmaceutical composition.